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Meier et al.

[45] Date of Patent: **Mar. 15, 1994****[54] RADIO FREQUENCY LOCAL AREA NETWORK****[75] Inventors:** Robert C. Meier; Marvin L. Sojka;
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Iowa**[73] Assignee:** Norand Corporation, Cedar Rapids,
Iowa**[21] Appl. No.:** 56,827**[22] Filed:** May 3, 1993**Related U.S. Application Data****[63]** Continuation of Ser. No. 769,425, Oct. 1, 1991.**[51] Int. Cl.:** H04K 1/00**[52] U.S. Cl.:** 375/1; 370/60;
370/95.1; 370/77; 370/93; 340/825**[58] Field of Search:** 375/1; 370/60, 85.6,
370/94.1, 95.1, 77, 93; 379/221, 209; 340/825**[56] References Cited****U.S. PATENT DOCUMENTS**

4,884,266 11/1989 Pflaumer .
 4,885,780 12/1989 Gopal et al. 379/221
 5,029,183 7/1991 Tymes .
 5,031,098 7/1991 Miller et al. .
 5,103,461 4/1992 Tymes .
 5,117,422 5/1992 Hauptschein et al. 370/95.1
 5,128,932 7/1992 Li 370/60
 5,142,550 8/1992 Tymes .
 5,157,687 10/1992 Tymes .

FOREIGN PATENT DOCUMENTS

281334 9/1988 European Pat. Off. .
 WO9202084 2/1992 World Int. Prop. O. .

OTHER PUBLICATIONS

L. Kleinrock and F. A. Tobagi, "Packet Switching in Radio Channels; Part IV—Stability Considerations and Dynamic Control in Carrier Sense Multiple Access,"

IEEE Transactions on Communications, vol. COM-25, No. 10, Oct. 1977.

M. B. Pursley, "The Role of Spread Spectrum in Packet Radio Networks," *Proceedings of the IEEE*, vol. 75, No. 1, Jan. 1987.

J. O. Onunga and R. W. Donaldson, "Performance Analysis of CSMA with Priority Acknowledgments (CSMA/PA) on Noisy Data Networks with Finite User Population," *IEEE Transactions on Communications*, vol. 39, No. 7, Jul. 1991.

L. Kleinrock and J. Silvester, "Spatial Rouse in Multihop Packet Radio Networks," *Proceedings of the IEEE*, vol. 75, No. 1, Jan. 1987.

F. Backes, "Transparent Bridges for Interconnection of IEEE 802 LANs," *IEEE Network*, vol. 2, No. 1, Jan. 1988.

International Standard ISO/DIS 8802-2.2.

A. S. Tanenbaum, "Computer Networks," Prentice Hall, Second Edition.

D. E. Comer, "Internetworking with TCP/IP", Prentice Hall.

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[57]**ABSTRACT**

An apparatus and a method for routing data in a radio data communication system having one or more host computers, one or more intermediate base stations, and one or more RF terminals organizes the intermediate base stations into an optimal spanning-tree network to control the routing of data to and from the RF terminals and the host computer efficiently and dynamically. Communication between the host computer and the RF terminals is achieved by using the network of intermediate base stations to transmit the data.

7 Claims, 1 Drawing Sheet